CORRESPONDENCE.

INTER-GLACIAL MAN.

SIR,—Will you allow me to record the discovery of Palæolithic flint implements, mammalian bones, and fresh-water shells in brick-earths below the Boulder-clay of East Anglia?

The great chalky Boulder-clay of this district I have shown in two Geological Survey Memoirs, now in the press, to belong to the early part of the Great Ice Age, and only to be "Upper Glacial" in so far as this district is concerned. Beneath this clay occur patches of brick-earth which may be of "Middle Glacial" age or even older, and from them I have obtained well-fashioned flint implements. These tools are the oldest yet described, although some of the well-known cave implements may be as old or older, their antiquity being doubtful, from the absence of Glacial deposits. The human remains from the Victoria Cave at Settle, beneath Glacial Clay, are in all probability of the same age as our Palæolithic gravels, and hence much newer than those in question.

I hope shortly to describe these interesting relics and their geological position fully.

SYDNEY B. J. SKERTCHLY.

H. M. GEOLOGICAL SURVEY, BRANDON,
September 1*st*, 1876.

THE STAINING OF ROCKS BENEATH THE MAGNESIAN LIMESTONE.

SIR,—Immediately below the Magnesian Limestone of Yorkshire there is a belt of shales and sandstones more or less red or purple in colour. For a long time these rocks were looked upon as a subdivision of the Permian Group, the main reason for placing them on that horizon being their marked red hue, which contrasts strongly with the blue or grey tints of the generality of the Carboniferous shales and sandstones. It is now, however, well known that these red beds are stained Carboniferous rocks, and as the staining is confined to the portions which are now capped by Magnesian Limestone, or which were probably once overlaid by that formation, there is good ground for believing that the Magnesian Limestone has had something to do with the change in colour. It seems likely that the effect has been produced by water, which has percolated through the Limestone and passed down into the stained rocks.[1]

In the hopes of throwing some light on the nature of the chemical reactions by which the change in colour has been brought about, I made the following experiment: Water saturated with carbonic acid gas, and containing finely divided limestone, was dropped slowly on lumps of gritstone in such a manner that very small quantities of the powder dropped at the same time. After the process had been continued for about six weeks, the stone was found to be stained dark red, and the staining was particularly marked in the bluish grey varieties. The quantity of the colouring matter was too small to allow of its being analysed, but it seemed to me likely that some salt

[1] J. C. Ward, Quart. Journ. Geol. Soc. vol. xxv. p. 295; GEOL. MAG. Vol. IX. p. 389. J. Lucas. GEOL. MAG. Vol. IX. p. 338. For another case of rock staining see Mems. of Geol. Survey of Great Britain, vol. i. p. 45.

of iron, probably the carbonate, was dissolved in the water, and precipitated by the carbonate of lime and magnesia as per-hydrate of iron.

In order to test the correctness of this explanation, I passed carbonic acid gas through water containing powdered grit, powdered limestone, and a mixture of the two; and since the stone that was stained was freely exposed to air and light, I was careful that the powders should be exposed in a similar manner. The powders were then allowed to dry and fresh water added. The process was repeated during several months, but in none of the three cases could I find a trace of iron in the liquid.

I am led to ask for a publication of my results, in the hope that some of your readers will suggest some other test experiments which may lead to the true explanation of the method by which the staining is produced.

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LLANDOVERY ROCKS IN THE LAKE DISTRICT.

SIR,—I notice that Mr. Hicks, in his last letter on this subject, is contented to meet his opponents on their own terms, and that he expresses his firm persuasion of the overthrow of their views solely by the evidence afforded by the Brachiopods and Trilobites which have been discovered in the disputed beds within the last few months. It may consequently be suspected that the Graptolites which swarm in these beds, but which have been so slightingly alluded to and hurried out of sight, have not a word to say upon the question. I am still, however, inclined to think that a good case can be made out by the aid of the Graptolites alone; and that the view of the Lower Llandovery age of the Coniston Mudstones, grounded upon this opinion, which I have held for some years, and which was strongly insisted upon in a joint-paper on the Coniston Group by Professor Nicholson and myself, read at the Bristol Meeting of the British Association (1875), needs but little extra confirmation.

I presume that most palæontologists are willing to admit that, whether the various genera and species of the Graptolites are of equal systematic value with those of the Brachiopoda and Trilobita or no, they are at least as easily identified by those who have studied them, and that it is tolerably certain that they were correspondingly affected by the conditions which brought about the gradual evolution and extinction of the various forms of the latter groups, whose remains are now found upon the same horizons with them. If so, it is surely highly unphilosophical to refuse to allow full value to those points now known with a close approximation to certainty regarding the presence and range of the Graptolites which all would be willing to grant at once, where the other groups are concerned. Following here, therefore, the usual line of argument adopted when the latter are relied upon as indices of the systematic place of their containing beds, we observe—

Firstly—(*a.*) The Coniston Mudstones consist of a thin group of shales (black below, and grey or purple above), which reposes upon a limestone containing many of the very highest Bala fossils, and